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First record of *Vampyrodes caraccioli* (Thomas, 1889) (Chiroptera, Phyllostomidae) in the state of Amazonas and its updated distribution in Brazil

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Abstract: The present note reports the first record of *Vampyrodes caraccioli* in the Brazilian state of Amazonas, and the central Amazon region, based on 44 specimens caught in the Auati-Paraná Extractive Reserve, north bank of the Solimões/Amazonas River. Our record fills a distribution gap of this species in the Brazilian Amazon and illustrates that the current knowledge on the distribution of Amazonian bats is far from complete.

Key words: Great Striped-Faced Bat; Amazon; geographical distribution

The genus *Vampyrodes* Thomas, 1900 currently includes two species, *V. caraccioli* (Thomas, 1889) and *V. major* Allen, 1908 (Velazco and Simmons 2011). *Vampyrodes caraccioli* can be easily distinguished from *V. major* by the following morphological characteristics: U-shaped uropatagium posterior margin with dense and short hair (> 2 mm) (V-shaped with dense and long hair in *V. major* [> 2 mm]); metacarpal III longer than metacarpal V (metacarpal III shorter than metacarpal V in *V. major*); two genal vibrissae present (three genal vibrissae in *V. major*); slender rostrum (broad and robust rostrum in *V. major*); parietal foramina well separated from the nuchal crest (parietal foramina are closer to the nuchal crest in *V. major*); groove between the occipital condyle and paracondylar process weakly developed (well developed in *V. major*); paraoccipital processes well developed (moderately developed in *V. major*); upper inner incisors broad (slender in *V. major*); M2 parastyle absent or poorly developed (well developed in *V. major*); M2 postentoconule absent or poorly developed (well developed in *V. major*); lower incisors are robust (slender in *V. major*); and absence of a cuspule on the m1 paracristid (cuspule present on the m1 paracristid in *V. major*) (Velazco and Simmons 2011). In most of the external and craniodental measurements *V. caraccioli* is smaller than *V. major*, but there is some overlap in measurements where smaller individuals of *V. major* have similar measurements than larger *V. caraccioli* individuals (Velazco and Simmons 2011). *Vampyrodes major* is distributed from southern Mexico (Chiapas and Oaxaca) southwards, passing through Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, western Colombia and Ecuador (Willis et al. 1990; Gardner 2008; Velazco and Simmons 2011). *Vampyrodes caraccioli* occurs in eastern Colombia, eastern Ecuador, Peru, Bolivia, Venezuela, Trinidad and Tobago, French Guiana, Guyana, Suriname and Brazil (Willis et al. 1990; Velazco and Simmons 2011). Although it has an extensive distribution, *V. caraccioli* seems to be rare at lower latitudes and prefers moist and wet forests (Handley 1966; Gardner 2008; Velazco et al. 2010; Carvalho et al. 2014).

In Brazil, *V. caraccioli* has confirmed records (vouchered) from nine states: Acre (Taddei et al. 1990; Nogueira et al. 1999), Amapá (Martins et al. 2006, 2011; Martins 2012), Bahia (Faria et al. 2006), Mato Grosso (Sousa 2011), Mato Grosso do Sul (Cáceres et al. 2008), Pará (Thomas 1920; Kalko and Handley 2001; Peters et al. 2006; Tavares et al. 2012), Paraná (Scultori 2009; Carvalho et al. 2014), Rio de Janeiro (Bezerra et al. 2004; Peracchi and Nogueira 2008; Souza et al. 2015), and São Paulo (Velazco et al. 2010) (Table 1). Velazco et al. (2010) and Carvalho et al. (2014) while reporting new Brazilian records of *V. caraccioli* from the states of São Paulo and Paraná respectively, overlooked some prior reports of the species (e.g., Aguiar 2000; Cáceres et al. 2008; Sousa 2011; Tavares 2013). Although *V. caraccioli* has been reported from the state of Goiás, this can be disputed

Table 1. Locality records of *Vampyrodes caraccioli* in Brazil. The code number refers to the points shown in Figure 1.

Code	Latitude	Longitude	State	Locality	Reference
1	–02.021611	–066.319444	Amazonas	Reserva Extrativista Auati–Paraná	This study
1	–01.998889	–066.204583	Amazonas	Reserva Extrativista Auati–Paraná	This study
2	–07.6666	–072.6666	Acre	Seringal Lagoinha, Rio Juruá	Taddei et al. (1990)
2	–07.4500	–073.6833	Acre	Parque Nacional da Serra do Divisor	Nogueira et al. (1999)
3	01.284	–051.589	Amapá	Floresta Nacional do Amapá	Martins et al. (2006)
3	01.387	–051.928	Amapá	Parque Nacional Montanhas do Tumucumaque	Martins et al. (2011)
3	01.387	–052.741	Amapá	Parque Nacional Montanhas do Tumucumaque	Martins et al. (2011)
3	01.3019	–051.5881	Amapá	Floresta Nacional do Amapá	Martins et al. (2011)
3	00.133	–051.067	Amapá	Área de Protenção Ambiental do Curiaú	Martins (2012)
3	00.492	–052.693	Amapá	Itapeuara (Rio Jari)	Martins (2012)
3	02.193	–054.588	Amapá	Parque Nacional Montanhas do Tumucumaque	Martins (2012)
3	01.845	–052.741	Amapá	Parque Nacional Montanhas do Tumucumaque	Martins (2012)
3	00.31	–052.44	Amapá	Parque Nacional Montanhas do Tumucumaque	Martins (2012)
3	00.579	–052.319	Amapá	Reserva de Desenvolvimento Sustentável do Rio Iratapuru	Martins (2012)
4	–015.300	–039.069	Bahia	Una	Faria et al. 2006
5	–014.6372	–052.3636	Mato Grosso	Nova Xavantina	Sousa (2011)
5	–14.6700	–052.3644	Mato Grosso	Nova Xavantina	Sousa (2011)
5	–14.6800	–052.3253	Mato Grosso	Nova Xavantina	Sousa (2011)
5	–16.4708	–054.6356	Mato Grosso	Rondonópolis	Universidade Federal do Paraná – Coleção Mastozoológica – DZUP 1550; 1547
6	–19.6117	–056.9514	Mato Grosso do Sul	Corumbá	Cáceres et al. (2008)
7	–01.450	–048.483	Pará	Belém, Área de Pesquisa Ecológica do Guamá	Thomas (1920)
7	–01.45	–048.50	Pará	Belém, Área de Pesquisa Ecológica do Guamá	Kalko and Handley (2001)
7	–01.4333	–048.4667	Pará	Belém, Área de Pesquisa Ecológica do Guamá	Kalko and Handley (2001)
7	–07.6833	–051.8667	Pará	Ourilândia do Norte, Área Indígena Kayapó	Peters et al. (2006)
7	–04.866	–050.750	Pará	Floresta Nacional de Carajás	Tavares et al. (2012)
8	–25.350	–048.767	Paraná	Reserva Natural Morro da Mina	Scultori (2009)
8	–25.177	–048.308	Paraná	Reserva Natural Salto Morato	Carvalho et al. (2014)
9	–22.900	–043.233	Rio de Janeiro	Rio de Janeiro	Bezerra et al. (2004)
9	–22.942753	–044.040870	Rio de Janeiro	Mangaratiba	Peracchi and Nogueira (2008)
9	–23.066667	–043.883333	Rio de Janeiro	Marambaia	Lourenço et al. (2010)
9	–22.431	–042.756	Rio de Janeiro	Reserva Ecológica de Guapiaçu	Souza et al. (2015)
10	–23.726	–045.753	São Paulo	Parque Estadual da Serra do Mar	Velazco et al. (2010)

due to the lack of voucher material (Aguiar 2000; Silva-Júnior et al. 2007). In a similar way, the record of *V. caraccioli* from the state of Minas Gerais, presented by Tavares (2013), is not valid (V. Tavares pers. comm.). Carvalho et al. (2014, Figure 1), based on the study of Velazco et al. (2010, Figure 1), mistakenly indicated that the species was recorded in the state of Amazonas, Brazil. However, in the study by Velazco et al. (2010), the reported occurrences were in fact from Colombia and Peru on the border with the state of Amazonas, which may have been erroneously interpreted by Carvalho et al. (2014).

Here, we report for the first record of *V. caraccioli* from the state of Amazonas and provide an update on the distribution of the species in Brazil.

The specimens recorded here were collected during a bat inventory in the Auati-Paraná Extractive Reserve, state of Amazonas. Captures were performed using mist nets measuring 12 × 3 m, placed above the water column (depth of 1.5 m) at site 1 and set up at ground level at site 2. The nets were opened at 17:00 h, closed around 00:00 h, and checked every 30 minutes.

Sixteen specimens of *V. caraccioli*, all adult females, of which 11 were lactating and one was pregnant, were captured on 11 May 2015 in a secondary forest in a late stage of succession, in floodplain (01°59′56″S, 066°12′16.5″W) on the banks of the Auati-Paraná channel (site 1). In this location, together with the specimens of *V. caraccioli,* the following species were recorded: *Artibeus anderseni* Osgood, 1916; *Artibeus cinereus* (Gervais, 1856); *Artibeus planirostris* (Spix, 1823); *Carollia brevicauda* (Schinz, 1821); *Carollia perspicillata* (Linnaeus, 1758); *Chiroderma villosum* Peters, 1860; *Glossophaga soricina* (Pallas, 1766); *Myotis riparius* Handley, 1960; *Phyllostomus elongatus* (E. Geoffroy St.-Hilaire, 1810); *Platyrrhinus brachycephalus* (Rouk & Carter, 1972); *Rhynchonycteris naso* (Wied-Neuwied, 1820), *Saccopteryx bilineata* (Temminck, 1838), *Uroderma bilobatum* Peters, 1866; and *Uroderma magnirostrum* Davis, 1968.

Twenty-eight additional specimens of *V. caraccioli*, of which one was a male with a scrotal sac visible, but most were lactating females and only female showed no evidence of pregnancy or lactation, were captured on 16 May 2015 on the edge of the secondary forest, dominated

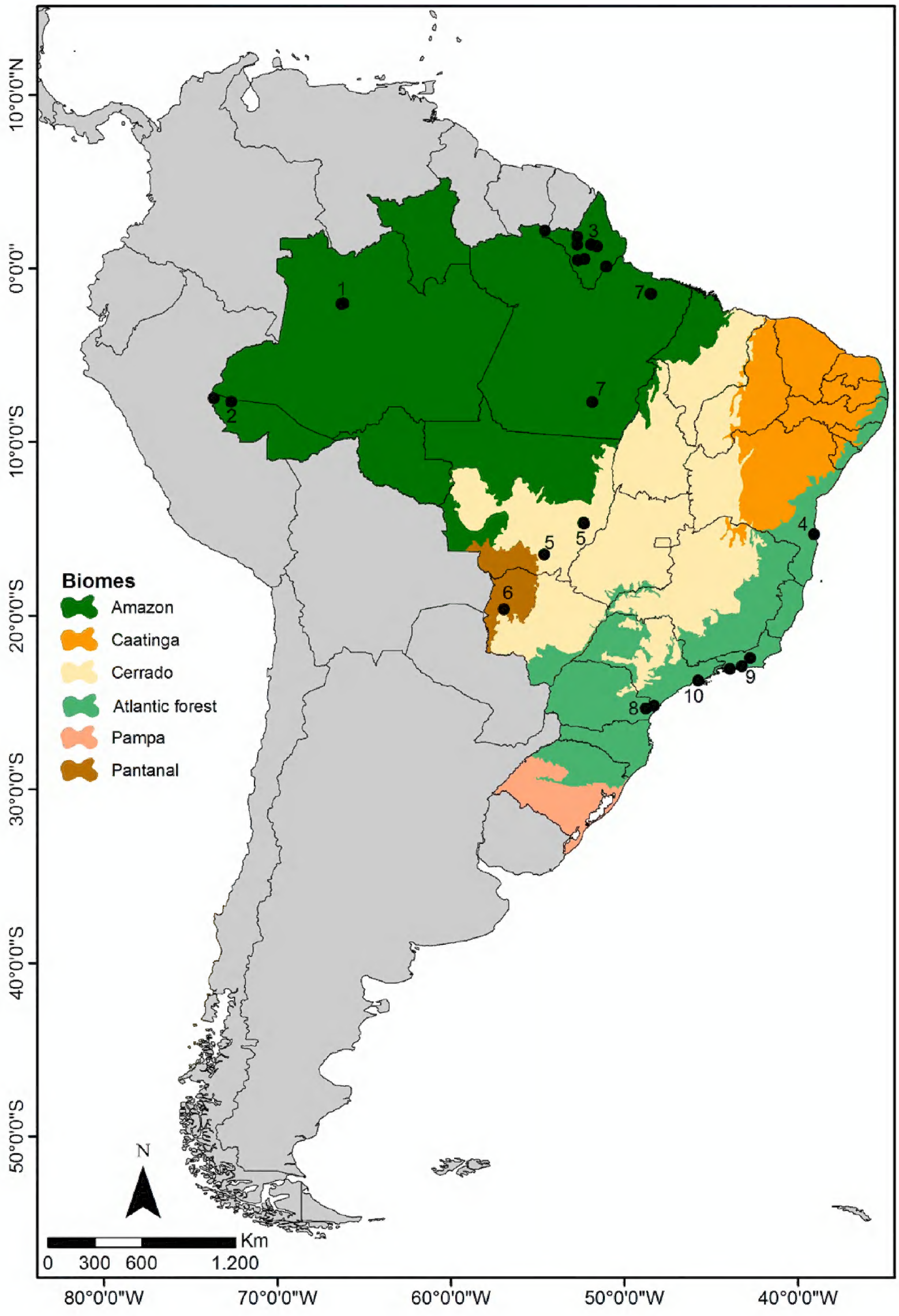

Figure 1. Known records of *Vampyrodes caraccioli* in Brazil. Numbers refer to entries in Table 1.

by fruit trees, in an upland rain forest (02°01′07.8″ S, 066°19′10″ W) on the shores of Lake Inambé (site 2). The following species were also captured in this locality: *Artibeus obscurus* (Schinz, 1821); *Artibeus planirostris*; *Artibeus gnomus* Handley, 1987; *Carollia perspicillata*; *Chiroderma villosum*; *Diphylla ecaudata* Spix, 1823; and *Platyrrhinus brachycephalus*.

Data collection was conducted with the authorization of the Chico Mendes Institute for Biodiversity Conservation, under the license of System of Authorization and Information on Biodiversity 42.111-2. Ten specimens were collected and sacrificed following the protocols defined by the American Society of Mammalogy (Sikes et al. 2011). The voucher specimens were fixed in 4%

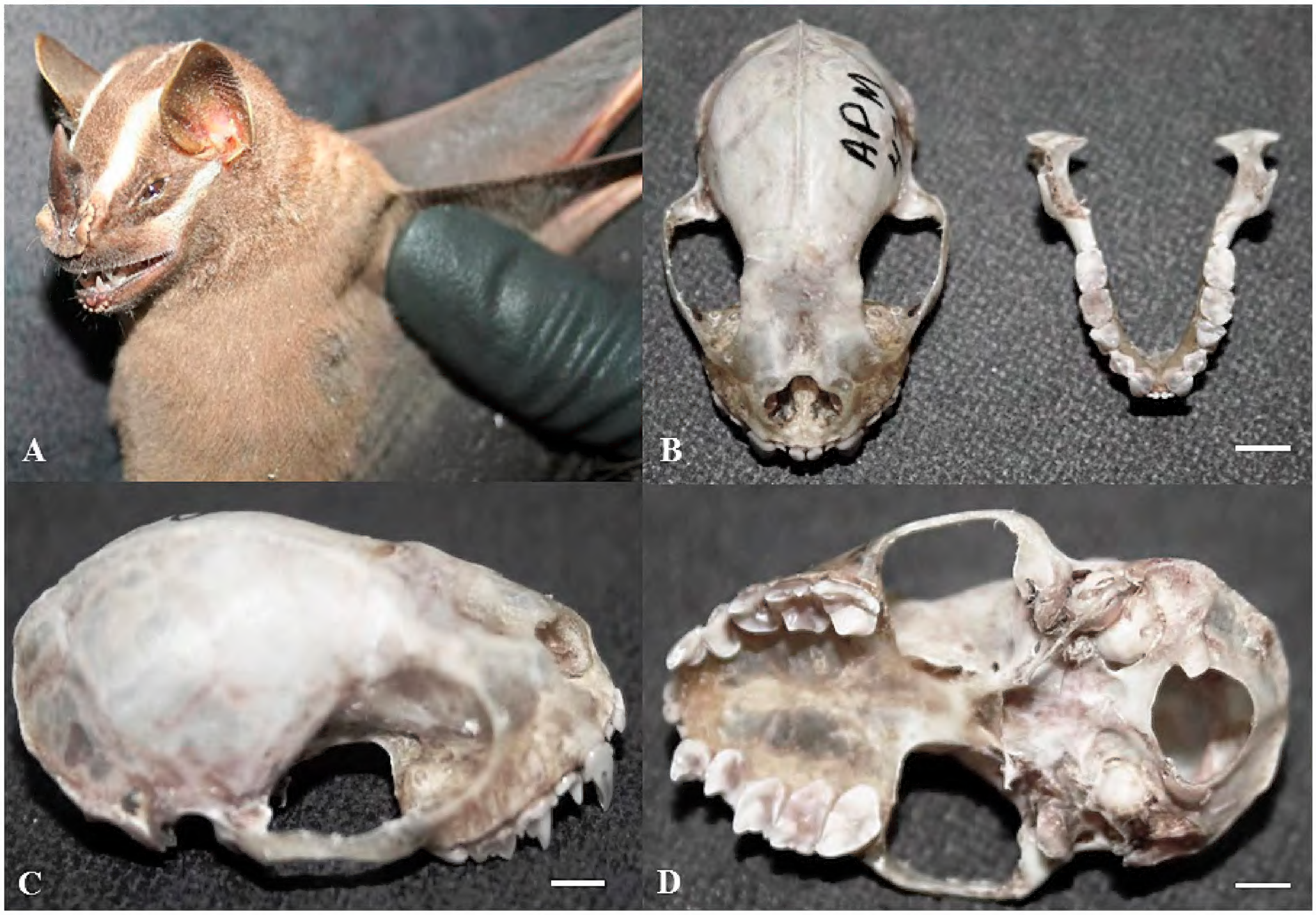

Figure 2. Photographs of a female specimen of *V. caraccioli* (IDSM 1182) collected in the Auati-Paraná Extractive Reserve. (**A**) live specimen, (**B**) dorsal views of the skull and mandible, (**C**) dorsolateral view of the skull, and (**D**) ventral view of the skull. Photos by Gerson P. Lopes. Scale bar = 2 mm.

formalin and later preserved in 70% ethanol and are deposited in the Mammal Collection of the Institute for Sustainable Development Mamirauá, Amazonas, Brazil (IDSM) under the collection numbers IDMS 1181–1190.

The identification of specimens was based on the characters provided by Velazco and Simmons (2011) which are as follows: light to dark brown on the back, with lighter fur on the venter; presence of a distinct dorsal white stripe that runs from the top of the head to the base of the uropatagium; four distinct facial white stripes, with the suborbital stripes ranging from the corner of its mouth to the base of the ear, and the supra-orbital stripes ranging from the noseleaf to above the ear (Figure 2); absence of a groove on the mesial portion of second upper premolar; presence of two upper molars and three lower molars; absence of lingual cingula on the metacones of M1 and M2; absence of a lingual cingulum on M1; and absence of a cusp on the mesial portion of the protocone on M1.

Our specimens represent the first record of *V. caraccioli* from the state of Amazonas and central Amazon. These records fill a gap in the distribution of this species in the Brazilian Amazon, whose closest record is more than 940 km to the southwest, at Seringal Lagoinha, state of Acre.

The bat fauna is among the richest among all of the mammal groups distributed in the Amazon (Voss and Emmons 1996). Despite being the biome with the largest number of species in Brazil, only 23.9% of the Brazilian Amazon is represented by at least one record of bats, and only 5.1% of its area is considered minimally sampled (Bernard et al. 2011a, 2011b; Martins et al. 2011). Fragmented records of bats in the Amazon show that large gaps still need to be filled, including portions of northern and southern Amazonas state that are distant from the state capital at Manaus (Bernard et al. 2011b). Moreover, even in intensively sampled sites, such as the Biological Dynamics of Forest Fragments Project in Manaus (Sampaio et al. 2003), *V. caraccioli* has not been recorded.

We emphasize that although *V. caraccioli* is not commonly captured in Brazil, all specimens obtained here were collected within two evenings. This high number of specimens may be explained by the abundance of various fruiting trees in the study sites in proximity to the mist nets (e.g., *Cecropia* sp., *Ficus* sp., *Piper* sp., *Pouteria* sp., and *Vismia* sp.). In the other 18 days of the

expedition in the primary forest, no other *Vampyrodes* specimen was captured. The records of *V. caraccioli* in the Cerrado biome (Aguiar 2000; Silva-Júnior et al. 2007; Sousa 2011) also contradict the belief that this species is a frugivore strictly associated with tropical rain forests (Gardner 1977, 2008).

Although the Amazon harbors 87% of Brazil's bat fauna, basic knowledge on the distribution of Amazon bats is far from complete, with intensive surveys at only a few sites and many areas without any surveys whatsoever (Bernard et al. 2011b). In fact, the Amazon is the region least sampled for bats, which emphasizes the need of further research to better understand basic knowledge on bat distribution (Bernard et al. 2011b).

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